Master of Science (Information Technology)

PROGRAMME GUIDE

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INTRODUCTION

The MSc IT programme is built to strengthen and brewing the innovative power of doing by yourself approach. It is designed for learners intend to construct strong basic understanding in the field of Information Technology.

PROGRAMME OUTCOMES

Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviours that students acquire in their matriculation through the program

1. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of upcoming technological changes.
2. **Analysis & design of complex problems:** An ability to apply knowledge of computer science concepts, principles & techniques to solve various challenging computing problems.
3. **Coding skills:** Apply and solve problems using computer programming and simulation.
4. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities for societal benefits.
5. **Communication:** Communicate effectively problem findings, and to be able to assimilate, write and present effective design documents to give and receive clear instructions.
6. **Societal Impact:** Acquire and apply advanced knowledge of concepts and participate in sustainable development.
7. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PROGRAMME SPECIFIC OUTCOMES

1. **PSO1:** Understand and comprehend advanced level of programming, data structures, databases, networking, mobile computing, information security and data analysis.
2. **PSO2:** Demonstrate competence in using computer science concepts and computational tools for simulation and digital transformation.
3. **PSO3:** Ability to effectively apply the information technology concepts to analyze, design and develop cost effective solutions to the societal problems.
4. **PSO4:** Provide user friendly and need based mobile, web or cloud based solutions to the society.

SALIENT FEATURES

- **Industry Immersion:** Trainings, projects and guest lecturers collaborated with industries help to learn from real life situations.
- **Contemporary Curriculum**: Instill knowledge in the major areas of computing such as Programming, Databases, Networking and Web Development.

- **Projects:** Project driven courses are designed to enhance technical and presentation skills.
- **Professional Enhancement:** In addition to core curricula, course offers subjects like communication, analytical and soft skills to enhance personality and employability.
- **Software Skills:** Curriculum is equipped with the latest technologies in databases, software engineering and web development essential to meet the demands of industry.

PROGRAMME CODE: DE1423

DURATION OF THE PROGRAMME:

Minimum Duration: 2 years

Maximum Duration: 4 years

MEDIUM OF INSTRUCTION/EXAMINATION:

Medium of instruction and Examination shall be English.

PROGRAMME STRUCTURE				
Term	**Core Courses (CR I, CR II, CR III A, CR III B) CR I+II – (8+4) 12 x 4 Credits CR III (A) - 1 x 4 Credits CR III (B) - 1 x 8 Credits**	**Ability Enhancement Courses (AECC) 1 x 4 Credits**	**Generic Electives (GE) 4 x 4 Credits**	**Credits**
I	Discipline Specific Core- I Discipline Specific Core- II Discipline Specific Core- III Discipline Specific Core- IV Discipline Specific Core- V Discipline Specific Core- VI			**24**
II	Discipline Specific Core- VII Discipline Specific Core- VIII Discipline Specific Core- IX Discipline Specific Core- X	**AECC- I** Analytical Skills	**GE-I** (Finance, Management, Marketing, Research)	**24**
III	Discipline Specific Core- XI Discipline Specific Core- XII **CR III A** TERM PAPER OR 1 Course from the GE Basket 1 which is not chosen as Generic Elective (GE)		**GE-II** **GE-III** (Finance, Management, Marketing, Research)	**20**
IV	Discipline Specific Core- XIII Discipline Specific Core- XIV **CR III B -**Project Work		**GE IV** (Finance, Management, Marketing, Research)	**20**
Total	**68 Credits**	**4 Credits**	**16 Credits**	**88**

MASTER OF SCIENCE (INFORMATION TECHNOLOGY) PROGRAMME SCHEME (ODL)					
COURSE CODE	**COURSE TITLE**	**Cr.**	**CA**	**ETE(Th.)**	**ETE(Pr.)**
TERM1					
DCAP100	PROGRAMMING IN C	4	30	40	30
DCAP174	COMPUTER ORGANISATION AND ARCHITECTURE	4	30	40	30
DCAP200	DATABASE MANAGEMENT SYSTEMS	4	30	40	30
DCAP145	FUNDAMENTALS OF INFORMATION TECHNOLOGY	4	30	40	30
DCAP256	COMPUTER NETWORKS	4	30	40	30
DMTH403	MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE	4	30	70	0
TERM2					
DCAP202	OBJECT ORIENTED PROGRAMMING	4	30	40	30
DCAP252	DATA STRUCTURES	4	30	40	30
DCAP446	DATA WAREHOUSING AND DATA MINING	4	30	70	0
DCAP560	OPERATING SYSTEM	4	30	70	0
GE- I	GENERIC ELECTIVE I	4	30	70	0
DPEA204	ANALYTICAL SKILLS	4	30	70	0
TERM3					
DCAP776	PROGRAMMING IN PYTHON	4	30	40	30
DCAP437	SOFTWARE ENGINEERING PRACTICES	4	30	70	0
GE- II	GENERIC ELECTIVE II	4	30	70	0
GE- III	GENERIC ELECTIVE III	4	30	70	0
DCAP756	TERM PAPER	4	0	0	100
	OR Course from the GE basket 1 which is not chosen as Generic Elective (GE).	4	30	70	0
TERM4					
DCAP348	INTRODUCTION TO BIG DATA	4	30	40	30
DCAP214	WEB PROGRAMMING	4	30	40	30
GE- IV	GENERIC ELECTIVE IV	4	30	40	30
DCAP788	PROJECT WORK	8	30	0	70
	TOTAL CREDITS	**88**			

GENERIC ELECTIVE (GE) BASKET 1								
S. No	**Course Code**	**Course Title**	**Credit**	**CA**	**ETE**	**ETP**	**Elective Area**	**Term**
1	DMGN581	ORGANIZATIONAL BEHAVIOUR AND HUMAN RESOURCE DYNAMICS	4	30	70	0	Management	2
2	DMKT503	MARKETING MANAGEMENT	4	30	70	0	Marketing	2
3	DFIN542	CORPORATE FINANCE	4	30	70	0	Finance	2
4	DGEN530	FUNDAMENTALS OF RESEARCH	4	30	70	0	Research	2

GENERIC ELECTIVE (GE) BASKET 2								
S. No	**Course Code**	**Course Title**	**Credit**	**CA**	**ETE**	**ETP**	**Elective Area**	**Term**
1	DMKT503	MARKETING MANAGEMENT	4	30	70	0	Management	3
2	DMKT613	CONSUMER BEHAVIOUR	4	30	70	0	Marketing	3
3	DFIN548	INTERNATIONAL FINANCIAL MANAGEMENT	4	30	70	0	Finance	3
4	DGEN531	RESEARCH METHODS AND DESIGN	4	30	70	0	Research	3

GENERIC ELECTIVE (GE) BASKET 3								
S. No	**Course Code**	**Course Title**	**Credit**	**CA**	**ETE**	**ETP**	**Elective Area**	**Term**
1	DFIN542	CORPORATE FINANCE	4	30	70	0	Management	3
2	DMKT512	DIGITAL AND SOCIAL MEDIA MARKETING	4	30	70	0	Marketing	3
3	DFIN508	INTERNATIONAL BANKING AND FOREX MANAGEMENT	4	30	70	0	Finance	3
4	DCAP797	RESEARCH PROJECT –I	4	30	0	70	Research	3

GENERIC ELECTIVE (GE) BASKET 4								
S. No	**Course Code**	**Course Title**	**Credit**	**CA**	**ETE**	**ETP**	**Elective Area**	**Term**
1	DOPR639	OPERATIONS MANAGEMENT AND RESEARCH	4	30	70	0	Management	4
2	DMKT687	CUSTOMER RELATIONSHIP MANAGEMENT	4	30	70	0	Marketing	4
3	DFIN611	SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT	4	30	70	0	Finance	4
4	DCAP798	RESEARCH PROJECT –II	4	30	0	70	Research	4

NOTE:

1. Students can adopt only one area from generic elective basket that will be applicable for the whole program.
2. In case of Term Paper student may choose one course against Term Paper from the Generic Basket 1which is not chosen as Generic Elective (GE).

Course Code	DCAP100	Course Title	PROGRAMMING IN C

WEIGHTAGE		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:

CO1: understand the basic concepts of programming like data types, control structures, functions and arrays
CO2: perceive problem solving through C programming
CO3: build sequential steps and procedures to solve a given problem
CO4: demonstrate the use of pointers and dynamic memory allocation
CO5: implement the knowledge and insights to create solutions

Unit No.	Topics
Unit- 1	**Introduction:** Introduction to programming language, machine language, Assembly Languages and High Level Languages, Program Development in C, The C character set, Identifiers and keywords
Unit- 2	**Data Types**: Data types, Constants and Variables
Unit- 3	**Input/ Output in C:** Unformatted and formatted I/O functions- print(), scan(), puts (), gets(), get char(), put char()
Unit- 4	**Operators**: Expressions, Arithmetic operators, Unary, Relational, logical, Assignment and Conditional Operator, Bitwise operators
Unit- 5	**Decision making statements**: Designing Structured Programs in C covering Top Down Design and Stepwise refinement, Type Conversion and Type Modifiers, If and If else, Switch Case
Unit- 6	**Loop Statements:** While and do-while, For Statement, Break and Continue statements, go to statement
Unit- 7	**Functions:** Function Definition and Prototypes, Scope Rules - Local and global scope, passing arguments by value and passing arguments by reference, Recursion, Library Functions
Unit- 8	**Storage Classes:** Storage Classes in C and their usage
Unit- 9	**Arrays:** Declaring arrays in C, Defining and processing 1D and 2D arrays, Defining and processing of multidimensional arrays, passing arrays to functions, Array applications: Sorting and searching, Character arrays, Return statement
Unit- 10	**Pointers:** Pointer data type, Pointer declaration, Initialization, accessing values using pointers, Pointer expressions and Arithmetic, Operations on Pointers, Pointers and arrays, Pointers and functions, Array of Pointers
Unit- 11	**Strings:** Defining and Initializing string, Reading and writing a string, Processing of string, String Library Functions, Pointers and strings
Unit- 12	**Dynamic Memory Management:** Dynamic Memory Management functions (malloc, calloc, realloc and free)
Unit- 13	**Structures and Union**: -Declaration, definition and initialization and accessing, Structures in functions, Structures and Pointers, Self-referential structures, Nested Structures and Unions

Unit- 14	**File Structures:** Categories of files, Opening and closing files, Text and binary files, Reading and writing in files, additional Features of C: creating header files, pre-processor directives and macros, appending in files

LABORATORY WORK:
Implementation of C Programming Concepts (Operators, Data types, Control Statements, Functions, Arrays, Strings, Structures, Union, Pointers, File Handling)

READINGS:

1. Programming in ANSI C by E. Balagurusamy, Tata McGraw Hill, Publishing Company Limited, New Delhi India
2. Programming with C by Gottfried, McGraw Hill Education
3. Programming with ANSI & Turbo C by Ashok N. Kamthane, Pearson Education.

Course Code	DCAP174	Course Title	COMPUTER ORGANIZATION AND ARCHITECTURE

WEIGHTAGE		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:
CO1: classify the functioning of digital systems and discuss the working of gates and circuits
CO2: identify the factors influencing the design of hardware and software elements of computer system
CO3: evaluate the various processor components and their interconnection

Unit No.	Contents
Unit- 1	**Binary Systems:** Number System, Number System Conversions, Complements, Fixed point and floating point representation
Unit- 2	**Boolean algebra:** Basic definitions of Boolean algebra, Axiomatic definition of Boolean algebra, Basic theorems and properties, Boolean functions, Karnaugh map & tabulation methods
Unit- 3	**Implementation of combinational logic design:** Logic gates and combinational circuits, Binary adder and subtractor, Decimal adder, Encoder and decoder, Multiplexer and demultiplexer, Binary parallel adders
Unit- 4	**Design of synchronous sequential circuits:** Sequential circuits, Latches and flip-flops, Analysis of clocked sequential circuits, State reduction and state assignment, Design of counters, Shift registers and ripple counters
Unit- 5	**Register Transfer and Micro operations**: Register Transfer Language, Register Transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic micro operations, Shift Micro operations
Unit- 6	**Instruction Codes and Instruction Cycle**: Instruction codes, Common Bus System, Timing and control, Instruction Cycle, Types of instructions
Unit- 7	**Machine Language**: Introduction of Machine Language, Assembly Language, Assembler Basics, program loops
Unit- 8	**Machine Programming:** Arithmetic and Logic Operation programming, Subroutines, Input-Output programming, Programming loops
Unit- 9	**Register Organization**: General Register Organization, Organization of stacks, Reverse Polish Notation
Unit- 10	**Addressing Modes:** Addressing Modes, RISC Instructions, Zero Address Instructions, One Address Instructions, Two Address Instructions, Three address Instructions
Unit- 11	**Pipeline processing:** Instruction and arithmetic pipeline, Pipeline hazards and their resolution, Parallel processing
Unit- 12	**Memory technology**: Cache memory and memory hierarchy, Virtual memory and memory management unit, Memory hierarchy, Associative memory, Cache memory
Unit- 13	**I/O subsystems**: Input-output devices, Interfacing with IO devices, Concept of handshaking,

	DMA data transfer, Asynchronous data transfer
Unit- 14	**Hardware description logic:** Introduction to hardware description language, HDL for combinational circuits

READINGS:

1. COMPUTER SYSTEM ARCHITECTURE by MORRIS MANO, PEARSON
2. DIGITAL LOGIC AND COMPUTER DESIGN by MORRIS MANO,M ., PRENTICE HALL
3. COMPUTER ARCHITECTURE A QUANTITATIVE APPROACH by DAVID A PATTERSON, PRENTICE HALL

Course Code	DCAP200	Course Title	DATABASE MANAGEMENT SYSTEM

WEIGHTAGE		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:

CO1: analyze the relational database model to understand the Logical and Physical aspects of the DBMS architecture

CO2: apply refined queries to fetch information from large datasets.

CO3: understand the normalization theory and apply such knowledge to normalization of a database.

CO4: apply and relate the concept of transaction, concurrency control and recovery in database.

CO5: describe the principles of storage structure and recovery management.

CO6: discuss distributed databases and be familiar with cloud databases.

Unit No.	Content
Unit-1	**Introduction to fundamentals of DBMS:** Database applications, Purpose of database systems, Components of DBMS, DBMS Architecture, Different Data Models, Data Independence, Various types of constraints
Unit-2	**Database design and ER model:** Overview of Design process, Entity relationship model, constraints, ER Diagrams, ER Design issues, Weak entity sets, extended ER features
Unit-3	**Relational Databases:** Relational Model, Structure of Relational databases, fundamental, additional and extended relational algebra operations, Views, DDL statements in SQL, DML statements in SQL, JOINS
Unit-4	**SQL (DDL):** Implementation of Data Definition Language, data types, schema definition, Basic structure of SQL Queries- CREATE, ALTER, DROP, RENAME, TRUNCATE.
Unit-5	**SQL (DML):** DML commands - SELECT, INSERT, DELETE and UPDATE operations, implementation of constraints, implementation of joins, Nested sub queries, Complex queries, Views, Joined relations.
Unit-6	**Relational Languages**: Tuple Relational calculus, Domain relational calculus, Query by Example, Data log, Set Operations – UNION, INTERSECT, EXCEPT, Aggregate Functions, NULL values.
Unit-7	**Relational Database Design:** Features, Atomic Domains and first normal form, Functional dependency theory decomposition using functional dependencies, decomposition using Multi valued dependencies, More normal forms, database design process.
Unit-8	**Transaction Management:** Concept of Transaction, Transaction State, Implementation of atomicity and durability, concurrent execution, Serializability, Recoverability, Implementation of Isolation, testing for Serializability.
Unit-9	**Concurrency Control:** Lock based protocols, Timestamp based protocols, Validation based protocols, Deadlock handling, Insert and Delete operations, Weak levels of consistency.
Unit-10	**SQL (DCL/TCL):** implementation of GRANT, REVOKE, ROLLBACK, COMMIT, SAVEPOINT, implementation of aggregate functions, implementation of inbuilt character functions, implementation of inbuilt numeric functions, implementation of inbuilt date & time

	functions
Unit-11	**Recovery system:** Failure classification, storage structure, recovery and atomicity, log-based recovery, recovery with concurrent transactions, buffer management, failure with loss of non-volatile storage
Unit-12	**Distributed Databases:** Distributed Databases, Data Fragmentation, Replication and Allocation Techniques, Semi Join, Homogeneous and Heterogeneous Databases, Distributed Data Storage, Distributed Transactions.
Unit-13	**Cloud-Based Databases:** From collaborative to the Cloud – A short history, Introduction to Client – Server Computing, Peer-to-Peer Computing, Distributed Computing, Grid Computing, Collaborative Computing, Cloud Computing. Functioning of Cloud Computing, Differences between Distributed computing and Cloud computing.
Unit-14	**Introduction to PL/SQL:** introduction to PL/SQL blocks, conditional statements, loops, cursors and triggers

LABORATORY WORK:

SQL (DDL): Implementation of Data Definition Language, datatypes, schema definition, Basic structure of SQL Queries- CREATE, ALTER, DROP, RENAME, TRUNCATE
SQL (DML): DML commands - SELECT, INSERT, DELETE and UPDATE operations, implementation of constraints, implementation of joins, Nested subqueries, Complex queries, Views, Joined relations.
SQL (DCL/TCL): implementation of GRANT, REVOKE, ROLLBACK, COMMIT, SAVEPOINT, implementation of aggregate functions, implementation of inbuilt character functions, implementation of inbuilt numeric functions, implementation of inbuilt date & time functions
Introduction to PL/SQL: introduction to PL/SQL blocks, conditional statements, loops, cursors and triggers.

READINGS:

1. Author: H. F. Korth & A. Silberschatz, Title: Database System Concepts, Publishers: Tata McGraw Hill, New Delhi, Year 2006
2. Ivan Bayross, SQL, PL/SQL The Programming Language of Oracle, BPB Publication.
3. Elmasri & Navathe, Fundamentals of Database systems, Addison & Weisely, New Delhi.
4. C. J. Date, Database Systems, Prentice Hall of India, New Delhi.
5. P. Bhatia & G. Singh, Simplified Approach to DBMS, Kalyani Publishers.
6. Martin Gruber, Understanding SQL, BPB Publication, New Delhi.
7. Val Occardi, Relational Database: Theory & Practice, BPB Publication, New Delhi.

Course code	DCAP145	Course Title	FUNDAMENTALS OF INFORMATION TECHNOLOGY

WEIGHTAGE		
CA	ETE (Th.)	ETE (Pr.)
30	40	30

Course Outcomes:

CO1: understand basic concepts and terminology of information technology.

CO2: have a basic understanding of personal computers and their operations.

CO3: understand various software and hardware, various security issues.

CO4: familiarize students with complete fundamentals and the packages commonly used in computing software

CO5: gain writing skills and various presentation aspects using word processing software

Unit No.	Contents
Unit- 1	**Computer Fundamentals:** Characteristics &Generation of Computers, Block diagram of Computer. Application of IT in various sectors. **Data Representation:** Binary Number System Octal, Hexadecimal, decimal and their Conversion.
Unit- 2	**Memory:** Types, Units of memory, RAM, ROM, Secondary storage devices –HDD, Flash Drives, Optical Disks: DVD, SSD **I/O Devices**–Keyboard, Mouse, LCDs, Scanner, Plotter, Printer & Latest I/O devices in market
Unit- 3	**Processing Data:** Transforming data into information, how computers represent data, How computers process data, Machine cycles, Memory, Registers, The Bus, Cache Memory
Unit- 4	**Operating Systems:** operating system basics, Purpose of the operating system, types of operating system, providing a user interface, Running Programs, Sharing Information, Managing Hardware, Enhancing an OS with utility software.
Unit- 5	**Data Communication**: Local and Global reach of the network, Digital and Analog Transmission, Data communication with standard telephone lines and Modems, Using Digital Data Connections, Wireless networks
Unit- 6	**Networks:** Sharing data any time anywhere, uses of a network, Common types of a network, Hybrid Networks, how net works are structured, Network topologies and Protocols, Network Media, Network Hardware
Unit- 7	**Graphics and Multimedia:** Understanding graphics File Formats, Getting Images into your Computer, Graphics Software, Multimedia Basics
Unit- 8	**Data Base Management Systems**: The Database, The DBMS, Working with a database, Data bases at Work, Common Corporate Database Management Systems
Unit- 9	**Software Programming and Development:** What is computer Program, hardware/Software Interaction, planning a Computer Program, how programs Solve Problems
Unit- 10	**Programming Language sand Programming Process:** Categories of Programming Languages, Machine and Assembly Language, Higher Level Languages, WWW

	development languages, The SDL C of Programming
Unit- 11	**Internet:** Basic Internet terms: Web Page, Website, Homepage, Browser, URL, Hypertext, ISP, Web Server, HTML, DHTML, XML, Introduction to client side and server side scripting. **Applications:** WWW, e-mail, Instant Messaging, Internet Telephony, Video conferencing, Web Browser & its environment
Unit- 12	**Understanding The Need of Security Measures:** Basic Security Concepts, Threats to Users, Threats to Hardware, Threat to Data, Cyber Terrorism. **Taking Protective Measures:** Keeping your System Safe, Protecting Yourself, protecting your Privacy, Managing Cookies, Spyware and other BUGS, keeping your data secure, Backing Up data , Safe guarding your hardware
Unit- 13	**Cloud Computing and IoT**: SaaS, PaaS, IaaS, Public and Private Cloud; Virtualization, Virtual Server, Cloud Storage, Database Storage, Resource Management, Service Level Agreement, Basics of IoT and its applications.
Unit- 14	**Futuristic World of Data Analytics:** Introduction to Big data and Analysis Techniques: Elements, Variables, and Data categorization Levels of Measurement, Data management and indexing, Introduction to statistical learning and overview of various tools used for data analysis.

LABORATORY WORK:

1. Hardware familiarizing with various I/O Peripheral devices, storage devices.
2. Familiarity with DOS, Implementing various internal and external commands in DOS.
3. **MS Windows:** Familiarizing with windows operating system; using built-in accessories; managing files and folders using windows explorer; working with control panel; installing hardware and software.
4. MS-Office (or any other Office Suite),meaning and features, its components.

Course code	DCAP256	Course Title	COMPUTER NETWORKS

WEIGHTAGE		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:

CO1: examine the importance of data communication in daily activities

CO2: recognize the different networking devices and their functionalities

CO3: utilize the role of protocols in networking and analyse the services and features of the various layers of network

CO4: validate the program, date and hardware is available to everyone on the network without regard to the physical location of the resource and the users

Unit No.	Contents
Unit- 1	**Introduction to computer networks:** definition, characteristics, applications and classification of computer networks – PAN, LAN, MAN, WAN, internetworks, network topology.
Unit- 2	**Data communication:** data communication components, characteristics, transmission impairments, transmission modes, protocol – its component and functions.
Unit- 3	**Network models:** layered architecture, benefits of layered architecture, OSI reference model, TCP/IP protocol suite, functions of layers in OSI and TCP/IP models.
Unit- 4	**Physical layer:** services of physical layer, transmission medium – wired and wireless, networking devices.
Unit- 5	**Data link layer - error detection and correction methods:** one and two dimensional parity method, hamming code, cyclic redundancy check (crc); framing- character stuffing, bit stuffing.
Unit- 6	**Data link layer - flow and error control protocols:** protocols for noiseless and noisy channels - simplest protocol, stop-and-wait protocol; stop-and-wait ARQ, go-back-n ARQ, selective repeat ARQ.
Unit- 7	**Data link layer - medium access control protocols:** pure ALOHA and slotted ALOHA, persistent and non-persistent CSMA, CSMA/CD, CSMA/CA.
Unit- 8	**Network layer - logical addressing:** IPV4 addressing, class full addressing, classless addressing, sub netting, network address translation, IPV6 addressing, address resolution protocol (ARP), reverse address resolution protocol (RARP).
Unit- 9	**Network layer – routing: Uni cast routing:** routing characteristics,

	routing algorithms, comparison of routing algorithm, broadcast and multicast **routing:** broadcast routing, multicast routing, routing in adhoc networks.
Unit- 10	**Transport layer - protocols:** services of transport layer, connection oriented and connectionless services, connection establishment, connection release, TCP, UDP.
Unit- 11	**Transport layer - congestion control and QoS:** general principles of congestion control, congestion avoidance and prevention policies; quality of service- types of traffic, traffic shaping, leaky bucket algorithm, token bucket algorithm.
Unit- 12	**Application layer – services and protocols:** remote login (TELNET), file transfer protocol (FTP), domain name system (DNS), e-mail - simple mail transfer protocol (SMTP), post office protocol (POP), internet message access protocol (IMAP).
Unit- 13	**Internet and WWW:** internet basics, hypertext transfer protocol (http), world wide web (www), security in internet – IPSec, VPN.
Unit- 14	**Network Security:** goals of network security, principles of cryptography, message integrity, securing e-mail, operational security: firewalls, types of firewalls.

READINGS:

1. DATA COMMUNICATION AND NETWORKING by B.A. FOROUZAN, MCGRAW HILL EDUCATION

2. DATA AND COMPUTER COMMUNICATIONS by WILLIAM STALLINGS, PEARSON

course code	DMTH403	Course Title	MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: recall formal logical arguments of propositional logic

CO2: perceive problem solving through the basics of combinatory

CO3: compare the basic discrete structures and algorithms

CO4: apply the concepts of trees to find the shortest path

CO5: infer properties of graphs and be able to relate these to practical examples

CO6: formulate and prove theorems about trees, connectivity, coloring and planar graphs

Unit No.	Contents
Unit- 1	Introduction, conjunction, disjunction & negation, propositions and truth table, Tautologies and contradictions, equivalence of formulas, duality law.
Unit- 2	Predicates, the statement function, variables and quantifiers, predicate formulas. Methods of proof (Inference Theory).
Unit- 3	Partially Ordered Sets, External elements of POSET, HASSE Diagrams of POSETS, Well-Ordered Sets, Lattices, Bounded Lattices, Distributive Lattices,
Unit- 4	Introduction to Boolean algebra, Basic Definitions, Duality, Basic Theorems, Boolean Algebras as Lattices
Unit- 5	Introduction, Basic Counting Principles, Mathematical Functions, Permutations
Unit- 6	Combinations, the Pigeonhole Principle
Unit- 7	Terminology and special types of graphs, graph isomorphism
Unit- 8	Paths, cycles and connectivity
Unit- 9	Euler and Hamilton path and graphs
Unit- 10	shortest path problems, planner graphs,
Unit- 11	graph coloring, chromatic number of graphs,
Unit- 12	tree and its properties, rooted tree
Unit- 13	spanning and minimum spanning tree, binary search tree
Unit- 14	infix, prefix, and post-fix notation, pre-order traversal, in-order traversal, and post-order traversal

READINGS:

1. DISCRETE MATHEMATICS AND ITS APPLICATIONS by KENNETH H ROSEN., M.G.Hills

2. DISCRETE MATHEMATICS (SCHAUM'S OUTLINES) (SIE) by SEYMOUR LIPSCHUTZ, MARC LIPSON, VARSHA H. PATIL, MCGRAW HILL EDUCATION

Course code:	DCAP202	Course Title:	OBJECT ORIENTED PROGRAMMING

WEIGHTAGES		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:

CO1: familiarize with the basic concepts of object-oriented programming

CO2: understand the object construction, memory allocation and deal location

CO3: develop programs using object-oriented concepts like encapsulation, inheritance and polymorphism

CO4: analyze the different behavior of overloaded operations in different situations

Unit No.	Contents
Unit- 1	**Principles of OOP:** introduction, procedural vs object oriented programming, basic concepts of object oriented programming, object oriented languages, benefits of OOP's
Unit- 2	**Basics of C++:** C Vs C++, a simple C++ program, compiling & linking, tokens, keywords, identifiers & constants, data types, reference variables
Unit- 3	**Operators and type casting:** operators in C++, scope resolution operator, member de-referencing operators, type casting: implicit and explicit type casting
Unit- 4	**Control structures:** decision making controls, iterative controls and jumping controls
Unit- 5	**Pointers and structures:** main function, function prototyping, handling pointers, C structures and limitations
Unit- 6	**Classes and objects:** specifying class, a sample C++ program with class, access specifies, defining member functions, nesting of member functions
Unit- 7	**More on classes and objects:** function definition inside the class and outside the class, private member functions, arrays within class, memory allocation of objects
Unit- 8	**Handling functions:** function calling mechanisms: call by Value, call by address & call by reference, objects as function arguments
Unit- 9	**More on functions:** inline functions, making outside function inline, friend functions
Unit- 10	**Static members and polymorphism:** Static Data Members & Static Functions, Function Overloading
Unit- 11	**Constructors and destructors:** constructors, parameterized constructors, copy constructor and dynamic constructor, multiple constructor in a class
Unit- 12	**More on constructors and destructors:** constructors with default arguments, dynamic initialization of objects, destructors
Unit- 13	**Inheritance:** defining derived classes, single inheritance, making a private member inheritable, multilevel inheritance, hierarchical inheritance, multiple inheritance, hybrid inheritance
Unit- 14	**File handling:** file handling operations: open, close, read and write

Laboratory Work:

Implementation of C++ Programming Concepts (Classes and objects, inline functions, friend functions, constructor and destructors, function overloading, inheritance, working with files)

READINGS:

1. OBJECT ORIENTED PROGRAMMING WITH C++ by E BALAGURUSAMY, MC GRAW HILL
2. LET US C++ by YASHAVANT KANETKAR, BPB PUBLICATIONS
3. OBJECT ORIENTED PROGRAMMING IN C++ by ROBERT LAFORE, GALGOTIA PUBLICATIONS 3. THE C++ PROGRAMMING LANGUAGE by BJARNE STROUSTRUP, PEARSON

Course code	DCAP252	Course Title	DATA STRUCTURES

WEIGHTAGES		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:

CO1: understand how basic data structures are represented in memory
CO2: comprehend the computational efficiency of the principal algorithms for searching and sorting
CO3: implement various data structures using sequential and linked representations
CO4: apply appropriate data structures to solve real world problems efficiently
CO5: analyze the alternate implementations of data structures to enhance performance
CO6: demonstrate different methods for traversing binary trees

Unit No.	Contents
Unit- 1	**Basic concepts**: introduction to data structures and algorithms, data structure Operations
Unit- 2	**Complexity of algorithms**: asymptotic notations for complexity, control structures,
Unit- 3	**Introduction to pointers**: advantages, pointer arithmetic, self-referential structures
Unit- 4	**Arrays:** concept of arrays: single dimensional, two dimensional, memory representation of arrays
Unit- 5	**Operations on arrays**: searching, traversal, insertion, deletion, concatenation and merging of two arrays
Unit- 6	**Linked lists:** introduction to linked list, dynamic memory allocation, representation of linked lists in memory, traversing a linked list, searching linked list, insertion and deletion into linked list
Unit- 7	**Doubly linked lists:** traversing a doubly linked list, insertion and deletion from doubly linked lists, circular linked list
Unit- 8	**Introduction to stacks**: representation of stacks, implementation of stacks using sequential and linked representation
Unit- 9	**Introduction to queues**: representation of queues, implementation of queues using sequential and linked representation
Unit- 10	**More on stacks and queues**: circular queues, deque, recursion
Unit- 11	**Trees**: concept of trees, representation of binary trees, binary search trees, traversal: recursive and non-recursive, searching, insertion and deletion in binary search trees
Unit- 12	**Graphs**: terminology of graphs, depth first search, breadth first search
Unit- 13	**Searching:** linear and binary search
Unit- 14	**Sorting**: bubble sort, shell sort, insertion sort, selection sort, merge sort, radix sort.

LABORATORY WORK:

Implementation of data structures concepts (arrays, singly linked list, doubly linked list, stacks, queues, binary search tree, depth first search, breadth first search, sorting and searching)

READINGS:

1. DATA STRUCTURES by SEYMOUR LIPSCHUTZ, MCGRAW HILL EDUCATION
2. DATA STRUCTURES USING C by REEMA THAREJA, OXFORD UNIVERSITY PRESS
3. DATA STRUCTURE USING C by MANOJ KUMAR, EAGLE PRAKASHAN
4. DATA STRUCTURES USING C by E BALAGURUSAMY, Tata McGraw Hill, India
5. DATA STRUCTURE AND ALGORITHM USING C by RS SALARIA, KHANNA PUBLISHERS

Course code	DCAP446	Course Title	DATA WAREHOUSING AND DATA MINING

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:
CO1: understand the various concepts of data warehousing like metadata, data mart, summary table, fact data and dimension data.
CO2: sail along with the various approaches in data mining.
CO3: familiarize with the various data ware housing and data mining tools.
CO4: observe the various methods to extract knowledge using data mining techniques
CO5: evaluate current trends in data mining such as web mining, spatial-temporal mining.
CO6: apply different data mining methodologies with information systems.
CO7: research of database systems and able to improve the decision-making process.

Unit No.	Contents
Unit- 1	**Data Warehousing and Online Analytical Processing**: Basic concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation
Unit- 2	**Introduction to data mining** : Basic concepts of data mining, Different types of data repositories, Data mining functionalities, Concept of interesting patterns, Data mining tasks, Current trends, Major issues and ethics in data mining
Unit- 3	**Data Warehousing Architecture:** Operational Data and Data store, Load Manager, Warehouse Manager, Query Manager, Detailed Data, Lightly and highly summarized Data, Archive/Backup Data, Meta-Data, architecture model, 2-tier, 3-tier and 4-tier data warehouse, End user Access tools.
Unit- 4	**Installation and development environment overview:** Downloading and installing Rapid miner and WEKA tool from source websites, Installing Rapid miner and WEKA tool on your windows computer
Unit- 5	**Introduction to mining tools:** Introduction to Rapid miner, Introduction to WEKA tool, features of tools, Comparison between Rapid Miner and WEKA, Overview of interface.
Unit- 6	**Extracting Data Sets:** Importing data into Rapid miner using different formats of files, Storing and retrieving data using rapid miner, Graphical representation of data in rapid miner, Hands on practice problems on data import/export.
Unit- 7	**Data Preprocessing:** Data cleaning, Data integration and transformation, Data reduction, Discretization and concept hierarchy generation
Unit- 8	**Data Pre-processing using rapid miner:** Identification and removal of duplicates, Apply operations for handling Meta data like rename or attribute role definition, Identify and remove the missing values in the data set, Apriori method for finding frequent item set WEKA /Rapid miner tool, Apply data mining pre-processing techniques and methods to large data sets, Hands on practice problems on data pre-processing.
Unit- 9	**Association and Correlation Analysis:** Basic concepts of frequent pattern and association rule, frequent item set generation with Apriori algorithm and FP

	Growth algorithm, Rule generation, Applications of Association rules
Unit- 10	**Clustering Algorithms and Cluster Analysis:** Measures of similarity, K means partitioning method, k medoids method, CLARANS method, Agglomerative and divisive clustering hierarchical method, BIRCH method, Density based methods - Subspace clustering, Graph-based clustering - MST clustering, Cluster evaluation, Outlier detection and analysis
Unit- 11	**Classification:** Introduction to classification, Introduction to Classification methods, Basic concepts of binary classification, Bayes theorem and Naive Bayes classifier, Association based classification, Rule based classifiers, Nearest neighbor classifiers, Decision Trees, Random Forest, Perceptions, Multi-category classification, Model over fitting, Cross validation
Unit- 12	**Prediction and Classification using WEKA Tool:** Applying model for prediction, Bayesian Classification on new imported data, Bayesian Classification on existed dummy data set, Decision Tree classification on both new and dummy data sets, Practice problems on classification methods, Applications of classification for web mining
Unit- 13	**Clustering methods using WEKA Tool:** Introduction to clustering, Introduction to Clustering algorithms, Differentiate clustering and classification, K-means clustering, Hierarchical clustering algorithm,
Unit- 14	**Applications of Data Warehousing and Data Mining:** Case studies of Data Warehousing in financial data analysis and retail industries, Case studies of Data Warehousing in Indian Railway reservation system and other industrial use, Case study on forecasting weather reports

READINGS:

1. DATA MINING: CONCEPTS AND TECHNIQUES by JAWEI HAN, MICHELINE KAMBER AND JIAN PE, MORGAN KAUFMANN
2. DATA WAREHOUSING, DATA MINING AND OLAP by ALEX BERSON AND STEPHEN J. SMITH, MC GRAW HILL
3. BUILDING THE DATA WAREHOUSE by INMON W. H, WILEY

Course code	DCAP560	Course Title	OPERATING SYSTEM

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcome:

CO1: understand the services and design of an operating system.
CO2: experiment with various process management and memory management techniques in Operating System
CO3: evaluate the performance of different disk scheduling techniques techniques.

Unit No.	Contents
Unit- 1	Introduction to operating system: Introduction, Types of operating systems, System components
Unit- 2	Operating system services, System calls, Types of System Calls
Unit- 3	Process: Process concept, Process states, Operations on processes
Unit- 4	Process Management: Process control block, Context switching, Process scheduling,
Unit- 5	Inter process communication, Threads and Multithreading, a case study on Windows/Linux
Unit- 6	CPU Scheduling: Introduction, Types of scheduling, Scheduling Criteria.
Unit- 7	Scheduling Algorithms, a case study on Windows/Linux
Unit- 8	Process Synchronization: Background, Critical section problem, Semaphores, Concept of serializability
Unit- 9	Deadlocks: Deadlock Characterization, Methods for handling deadlocks, Deadlock Prevention, Deadlock avoidance, Recovery from Deadlock, a case study on Windows/Linux
Unit- 10	Memory Management: logical versus physical address space, Address Binding, Dynamic Loading & Dynamic Linking
Unit- 11	Memory Management: Overlays, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging
Unit- 12	Memory Management: Page Replacement Algorithms, Allocation of frames, Thrashing, Working-set model, a case study on Windows/Linux
Unit- 13	Protection: Introduction, File Access Methods, Access Matrix.
Unit- 14	Disk Management: Disk structure, disk scheduling, FCFS scheduling, SSTF scheduling, SCAN scheduling, C-SCAN scheduling, a case study on Windows/Linux

READINGS:

1. OPERATING SYSTEMS CONCEPTS BY A SILBERSCHARTZ AND GALVIN, ADDISON-WESLEY
2. OPERATING SYSTEMS CONCEPTS AND DESIGN by MILAN MILANKOVIC, MCGRAW HILL EDUCATION
3. MODERN OPERATING SYSTEM by ANDREW S. TANENBAUM, PRENTICE HALL
4. THE DESIGN OF THE UNIX OPERATING SYSTEM by MAURICE J. BACH, PEARSON
5. BEGINNING LINUX PROGRAMMING by NEIL MATTHEW, WILEY
6. OPERATING SYSTEMS: PRINCIPLES AND DESIGN by CHOUDHURY, PABITRA PAL, PHI Learning Pvt Ltd

Course code	DPEA204	Course Title	ANALYTICAL SKILLS

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: apply the basic concepts of reasoning and quantitative aptitude
CO2: apply the learned concepts to solve the company specific reasoning and quantitative aptitude tests
CO3: analyze the problem and use logic to interpret and handle different situations

Unit No.	Contents
Unit- 1	**Number system**: Types of numbers, rules of divisibility, multiplicity and squaring of numbers, HCF and LCM of numbers
Unit- 2	**Average**: Average of numbers, Arithmetic Mean, Real life examples of average, Application based questions
Unit- 3	**Number series:** Series Completion, Analogy, Classification
Unit- 4	**Alphabet series:** Series Completion, Analogy, Classification
Unit- 5	**Coding Decoding**: Letter Coding, Direct Letter Coding, Number / Symbol Coding, deciphering message word codes, number and symbol codes for messages
Unit- 6	**Percentage**: Concept of Percentage, Comparison based questions, Application based questions
Unit- 7	**Profit and Loss**: Profit or Loss, Cost price, Selling price, Calculation of profit and loss percent, Application based questions, conceptual formulae
Unit- 8	**Simple interest**: concept of simple interest, general formulas, application based questions
Unit- 9	**Compound interest**: basic concepts and formula based questions, difference between simple interest and compound interest
Unit- 10	**Alphabet Test**: Alphabetical order of words, Letter-word problems, Word formation by unscrambling letters
Unit- 11	**Number Test**: Number Test, Position switching of numbers
Unit- 12	**Ranking and Time Sequence Test:** Ranking Test, Time Sequence Test
Unit- 13	**Direction Sense Test**: direction puzzle, sense the directions correctly
Unit- 14	**Blood Relation**: Coded Relations, relation based puzzle

READINGS:

1. A MODERN APPROACH TO NON-VERBAL REASONING by R S AGGARWAL, S Chand Publishing
2. QUANTITATIVE APTITUDE FOR COMPETITIVE EXAMINATIONS by R S AGGARWAL, S Chand Publishing
3. QUANTITATIVE APTITUDE by ABHIJIT GUHA, Tata McGraw Hill, India

Course code	DCAP776	Course Title	PROGRAMMING IN PYTHON

WEIGHTAGES		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:
CO1: understand the basic structure and features of Python programming
CO2: interpret object-oriented programming concepts such as encapsulation, inheritance and polymorphism as implemented in Python
CO3: apply pandas and NumPy for data analysis
CO4: implement machine learning algorithms
CO5: analyze real-life situation specific problems and perceive solutions
CO6: build exploratory data analysis and visualizations

Unit No.	Contents
Unit- 1	**Python basics:** introduction, data types and operators, control statements, functions
Unit- 2	**Python data structures: s**trings, lists, sets, tupples and dictionaries
Unit- 3	**OOP concepts:** OOP features, encapsulation, inheritance
Unit- 4	**More on OOP concepts:** function overloading, operator overloading and method overriding,
Unit- 5	**Exception handling**: catching exceptions, catching multiple exceptions, raising exceptions, custom exception
Unit- 6	**Introduction to NumPy**: arrays vs lists, array creation routines, arrays from existing data, indexing and slicing
Unit- 7	**Operations on NumPy arrays**: array manipulation, broadcasting, binary operators
Unit- 8	**NumPy functions**: mathematical functions, statistical functions, sort, search and counting functions
Unit- 9	**Handling data with pandas**: introduction to pandas, series, data frame, sorting, working with csv files, operations using data frame
Unit- 10	**Data cleanup:** investigation, matching and formatting
Unit- 11	**Data visualization:** introduction to matplotlib, line plot, multiple subplots in one figure, bar chart, histogram, box and whisker plot, scatter plot, pie charts
Unit- 12	**Data visualization:** introduction to seaborne, seaborne Vs mat plot lib, data visualization using seaborne
Unit- 13	**Machine learning:** introduction, types of machine learning
Unit- 14	**Machine learning algorithms:** linear regression, k-nearest neighbors, decision trees, random forests, k-means clustering

LABORATORY WORK:

Implementation of Python programming concepts (control statements, functions, strings, lists, sets, topples, dictionaries, OOP concepts, exception handling, NumPy arrays and functions, pandas, data visualization, machine learning algorithms)

READINGS:

1. Programming and Problem Solving with Python by Ashok Kamthane, Amit Ashok kamthane, Mc Graw Hill 2nd Edition
2. Hands-On Data Analysis with NumPy and pandas by Curtis Mille, Kindle Edition
3. Python for Data Analysis by Wes McKinney, O'Reilly Media
4. Machine Learning for Absolute Beginners by Oliver Theobald, Kindle Edition

Course code	DCAP437	Course Title	SOFTWARE ENGINEERING PRACTICES

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: apply theoretical foundation of software engineering in practical software development

CO2: analyze the need of software maintenance activities

CO3: discuss the software life cycle models

CO4: apply software engineering practices to create complex software designs

CO5: identify the importance of the software development process

Unit No.	Contents
Unit- 1	**Introduction to software engineering**: define software engineering, software process, software engineering practices
Unit- 2	**Software process models**: software development life cycle (SDLC), classical software development lifecycle model, prototyping model, V model, incremental Model, introduction to agile method of software development
Unit- 3	**Requirement engineering**: requirement engineering, requirement eliciting/gathering, negotiating requirement, validating requirement, requirement analysis, stakeholder analysis
Unit- 4	**Requirement specification**: software requirement specification document, characteristics of a good SRS, functional and non-functional requirement
Unit- 5	**Design**: design process, design concepts, coupling, cohesion, data flow diagram (DFD), flow chart, architectural design, component-based design, object-oriented design, class-based components, use case diagram, class diagram, activity diagram
Unit- 6	**User interface design**: golden rules, interface design models, interface design process, interface design activities
Unit- 7	**Standards**: good coding practices, coding standards, code reusability, documentation, documentation standards

Unit- 8	**Software testing**: test design, test planning, test case definition, test case template
Unit- 9	**Testing strategies**: black box testing, white box testing, sanity testing, smoke testing
Unit- 10	**Testing levels**: unit testing, integration testing, system testing, acceptance testing, regression testing
Unit- 11	**Bugs**: bug/defect definition, bugs life cycle, bug tracking, bug tracking tool (bugzilla overview)
Unit- 12	**Software maintenance**: software maintenance, software supportability, reengineering, business process reengineering, software reengineering, restructuring, economics of reengineering
Unit- 13	**Product metrics**: measure, metrics and indicators, measurement principles, function-based metrics, metrics for specification quality
Unit- 14	**Software process improvement**: approaches to SPI, maturity models, SPI process

READINGS:

1. FUNDAMENTALS OF SOFTWARE ENGINEERING by RAJIB MALL, PHI Learning

2. AN INTEGRATED APPROACH TO SOFTWARE ENGINEERING by PANKAJ JALOTE, NAROSA PUBLISHING HOUSE

Course code	DCAP348	Course Title	INTRODUCTION TO BIG DATA

WEIGHTAGES		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:
CO1: analyze the need and importance of fundamental concepts and principles of Big Data
CO2: apply internal functioning of different modules of Big Data and Hadoop
CO3: evaluate the big data ecosystem and appreciate its key components

Unit No.	Contents
Unit- 1	**Introduction to Big Data:** Big Data and its importance, The V's of Big Data, Challenges and Applications of Big Data, Tools used in Big Data Scenario.
Unit- 2	**Foundations for Big Data:** Distributed file system, scalable computing over internet, programming models for big data.
Unit- 3	**Data Models:** Data model vs data format, data stream, understanding data lakes, exploring streaming sensor data.
Unit- 4	**NOSQL Data Management:** Introduction to NoSQL , aggregate data models, aggregates key-value and document data models relationships, graph databases , schema less databases, materialized views, distribution models, sharding, version, Map reduce partitioning and combining , composing map-reduce calculations.
Unit- 5	**Introduction to Hadoop:** Understand what Hadoop is, learning about other open source software related to Hadoop, understand how Big Data solutions can work on the Cloud, Hadoop - Big Data Overview, Hadoop - Big Data Solutions.
Unit- 6	**Hadoop Administration:** Hadoop - Environment Setup, Hadoop - HDFS Overview, Starting HDFS, Hadoop - Command Reference.
Unit- 7	**Hadoop Architecture:** Understand the main Hadoop components, learn how HDFS works, List data access patterns for which HDFS is designed, describe how data is stored in an HDFS cluster.
Unit- 8	**Hadoop Master Slave Architecture:** Hadoop – Map Reduce, Hadoop – Streaming, Hadoop – Multi Node Cluster, Creating User Account, Configuring Key Based Login, Installing Hadoop and Configuring Hadoop on Master Server.
Unit- 9	**Hadoop Node Commands:** Configuring Master Node, Configuring Slave Node, Format Name Node on Hadoop Master, Starting Hadoop Services, Adding a New Data Node in the Hadoop Cluster, Adding User and SSH Access.
Unit- 10	**Map Reduce Applications:** Map Reduce workflows – unit tests with MRUnit – test data and local tests, anatomy of Map Reduce job run, classic Map-reduce, YARN failures in classic Map-reduce and YARN job scheduling, shuffle and sort, task execution, Map Reduce types, input formats, output formats.
Unit- 11	**Hadoop Ecosystem:** Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL, Querying Data in Hive, fundamentals of H Base and Zookeeper, IBM Info Sphere Big Insights and Streams.

Unit- 12	**Predictive Analytics:** Simple linear regression- Multiple linear regression- Interpretation of regression coefficients. Visualizations, Visual data analysis techniques, interaction techniques, Systems and applications.
Unit- 13	**Data Analytics with R:** Machine Learning, Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering, Big Data Analytics with Big R.
Unit- 14	**Big data management using SPLUNK:** data integration process, Big Data Management and Processing using Datameer, Installing Splunk Enterprise on Windows, Installing Splunk Enterprise on Linux, Exploring Splunk Queries.

READINGS:

1. INTRODUCTORY FUNCTIONAL ANALYSIS WITH APPLICATIONS by ERWIN KREYSZIG, WILEY
2. PRINCIPLES OF MATHEMATICAL ANALYSIS by WALTER RUDIN, MCGRAW HILL EDUCATION.

Course Code	DCAP214	Course Title	WEB PROGRAMMING

WEIGHTAGES		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:

CO1: understand the website layout creation using HTML language.

CO2: apply the website planning, management and maintenance techniques

CO3: apply dynamic website creation using Java script and J Query

CO4: illustrate logic implementation on a web page

CO5: understand how to manage versatile data one web page

Unit No.	Content
Unit-1	**Internet Basic:** basic concepts, communicating on the internet, internet domains, establishing connectivity to the internet, client IP address, IP address, TCP/IP.
Unit-2	**HTML Introduction: i**ntroduction, web server, web client/ browser, HTML tags
Unit-3	**HTML Command and Structure & Formatting: c**ommonly used HTML commands, structure of HTML program, formatting, text styles, text effects
Unit-4	**HTML List and Graphics:** HTML lists, types of lists, adding graphics to HTML document
Unit-5	**Creating Tables & Frames:** creating tables, linking documents, frames
Unit-6	**DHTML:** cascading style sheets, class, external style sheets
Unit-7	**Introduction to Java Script:** java script and web, <script> tag and browsers compatibility. data types: numeric, text, Boolean, type casting, arrays, operators and expressions in JavaScript
Unit-8	**Programming Constructs in JavaScript:** programming constructs, conditional and looping statements
Unit-9	**Functions in JavaScript:** functions, user defined functions, dialog boxes
Unit-10	**DOM Model & Browser Objects:** understanding DOM model, objects in HTML, browser objects, window, history, location, navigator, document object.
Unit-11	**Handling Events Using JavaScript:** handling events using JavaScript
Unit-12	**HTML Forms:** properties and methods, button, text, text area, checkboxes, radio buttons, select and option elements
Unit-13	**Built-in Objects in JavaScript:** built-in objects in JavaScript, string object, math object, date object, user defined objects
Unit-14	**Basics of J Query:** introduction to J Query, J Query events, animations and effects using J Query DOM using JavaScript: DOM concept in JavaScript, windows navigator, locations object with methods

READINGS:

1. HTML: THE COMPLETE REFERENCE by THOMAS A. POWELL, OSBORNE, MCGRAW HILL EDUCATION
2. WEB ENABLE COMMERCIAL APPLICATION DEVELOPMENT USING HTML, DHTML, JAVASCRIPT, PERL, CGI, BPB PUBLICATIONS, 2000. by IVAN BAYROSS, BPB PUBLICATIONS

Course Code	DMGN581	Course Title	ORGANISATIONAL BEHAVIOUR AND HUMAN RESOURCE DYNAMICS

WEIGHTAGES	
CA	ETE(Th.
30	70

Course Outcomes:
CO1: enumerate the concept of management practices and organizational behavior
CO2: develop and sharpen acumen of how different management thoughts can be used to improve organization functioning
CO3: analyze the importance of management practices and important organizational behavior dimensions at different levels of organization
CO4: appraise the dynamics of industrial relations and to manage them as per statutory regulations
CO5: apply human resource management functions to handle emerging issues

Unit No.	Content
Unit-1	**Organizational behavior:** relationship between management and organization behavior, model of OB and contributing disciplines to the OB field **Foundations of individual behavior:** values, attitude and job satisfaction, theories of learning and behavior modification
Unit-2	**Personality:** theories of personality and its assessment, transactional analysis and attribution theory of perception **Emotions:** emotional intelligence and affective events theory of emotion **Motivation:** early and contemporary theories of motivation
Unit-3	**Group dynamics:** group dynamics and its significance, types of groups, formation and stages of group development, group performance factors **Team development:** team formation, its types and difference between group and team
Unit-4	**Organizational conflict and negotiations:** conflict sources, types and levels of conflict, traditional and modern approaches to conflict, resolution of conflict through negotiation **Stress:** sources and consequences of stress, stress management techniques
Unit-5	**Introduction:** External and Internal Forces of environment affecting HRM, Objectives and functions of HRM. **Human Resource Planning:** HRP process, Barriers and Prerequisites for Successful HRP.
Unit-6	**Job Analysis:** Methods of Collecting Job Data, Potential Problems with Job Analysis, Job Design and its approaches, Process of Job Analysis
Unit-7	**Recruitment & Selection:** Meaning, Recruitment process, Recruitment Methods, Challenges in India and Selection Process
Unit-8	**Talent Management:** talent management, talent retention, talent acquisition and sources of talent acquisition

	Orientation, induction and placement: process of orientation, induction and placement programme, Evaluation of Orientation Programme
Unit-9	**Training and Development:** employee training, difference in training and development, methods of training, methods of management development, people capability maturity model
Unit-10	**Career planning and management:** career management, process of career planning, challenges in career planning
Unit-11	**Performance management system:** performance management, performance planning, performance appraisal, potential appraisal, feedback and counselling
Unit-12	**Compensation management:** types and theories of compensation, concept of wages, factors influencing compensation management, incentives and fringe benefits, employee engagement and retention.
Unit-13	**Managing industrial relations:** major actors and their roles in IR, factors influencing IR, approaches to IR, grievance handling procedure
Unit-14	**Industrial Disputes:** industrial disputes, methods of settlement of industrial disputes, trade unions and their challenges in India

READINGS:

1. Organizational Behaviour By Stephen P. Robbins. Timothy A. Judge. Neharika Vohra, Pearson
2. Management by Management By Stephen P. Robbins. Mary Coulter. Neharika Vohra, Pearson
3. Human Resource Management By Dessler, G. And Varkkey, B, Pearson

Course Code	DMKT503	CourseTitle	MARKETING MANAGEMENT

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:
CO1: analyze and respond to environmental and competitive changes, their impact on marketing planning, strategies and practices
CO2: apply the conceptual frameworks, theory and techniques to various marketing contexts
CO3: prepare marketing and sales plan appropriate to the needs of customers and contexts
CO4: determine strategies for developing new products and services that are consistent with evolving market needs

Unit No.	Content
Unit-1	**Introduction:** market and marketing, definition, nature and scope of marketing, exchange process, functions of marketing, core marketing concepts
Unit-2	**Marketing orientations:** evolution of modern marketing concept, holistic marketing concepts, new marketing orientations selling vs. marketing
Unit-3	**Marketing mix:** 7 P's & 7 C's of Marketing, 4 A's of Marketing, customer quality, value and satisfaction, Michael E. Porters chain analysis model
Unit-4	**Marketing environment**: Significance of scanning marketing environment; Analysis of macro environment of marketing – economic, demographic, socio-cultural, technological, political legal and ecological; Impact of micro and macro environment on marketing decisions
Unit-5	**Consumer behaviour:** buyer behaviour, different consumer roles, need for studying buyer behaviour, different buying motives, consumer buying decision process and influences, consumer vs. business buying behaviour, industrial buying process
Unit-6	**Segmentation decisions**: market segmentation, characteristics of a segment, bases for segmenting a consumer market, levels of market segmentation, factors influencing selection of market segments
Unit-7	**Targeting and positioning:** Benefits of market segmentation; Criteria for effective market segmentation; Target market selection and strategies; Positioning – concept, bases and process
Unit-8	**Product decisions:** concept and classification, layers of products, major product decisions, product-mix, new product development stages, packaging and labeling, product life cycle (PLC) – concept and appropriate strategies adopted at different stages
Unit-9	**Pricing decisions:** pricing – objectives, price sensitivity, factors affecting price of a product, pricing methods and strategies, ethical issues in product and pricing decisions
Unit-10	**Distribution planning:** channels of distribution – concept and importance, different types

	of distribution middlemen and their functions, selection, motivation and performance appraisal of distribution middlemen
Unit-11	**Distribution decisions:** decisions involved in setting up the channel, channel management strategies, distribution logistics – concept, importance and major logistics decisions, channel integration and systems, ethical issues in distribution decisions
Unit-12	**Distribution decisions:** retailing and wholesaling, types of retail formats, retail theories, retailing strategies, non-Store retailing, wholesaling – nature and importance, types of wholesalers, developments in retailing and wholesaling in indian perspective
Unit-13	**Promotion decisions:** role of promotion in marketing, promotion mix, integrated marketing communication, concept, communication process and promotion, determining promotion mix, factors influencing promotion mix, developing promotion campaigns, sales promotion, direct marketing, public relations, digital and social media
Unit-14	**Trends in marketing:** service Marketing, e-marketing, green marketing, customer relationship management, rural marketing, other emerging trends, ethical issues in marketing

READINGS:

1. Kotler, P. & Keller, K. L. (2017). Marketing Management. Pearson
2. McCarthy, E. J., Cannon, J. & Perreault, W. (2014). Basic Marketing. McGraw-Hill Education
3. Etzel, M. J., Walker, B. J., Staton, W. J., & Pandit, A. (2010).Marketing Concepts and Cases. Tata McGraw Hill

Course Code	DFIN542	CourseTitle	CORPORATE FINANCE

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: understanding finance function with respect to its evolution and growth

CO2: understanding the concept of Time Value of Money and interpreting the results based on calculations.

CO3: analyzing financing needs of the businesses and designing an optimum capital structure

CO4: understanding the retention and distribution of profits and impact on business valuation.

Unit No.	Content
Unit-1	Financial Management: An Overview**,** evolution of finance, the basic goal: creating shareholder value, agency issues, business ethics and social responsibility
Unit-2	Sources of Finance: Long term and Short-term sources of finance- Ordinary shares, Preferences shares, redeemable irredeemable debentures, Debt vs. Equity.
Unit-3	Money Market Instruments: Treasury Bills, Commercial Papers, Certificate of Deposits, Treasury Management and Treasury Operations in corporate. External Commercial Borrowings, Financing for MSMEs
Unit-4	Time Value of Money concept: Compounding and discounting, Future value and Present value, Annuities, Effective interest rates
Unit-5	Investment Decisions**:** Capital Budgeting Decisions, Rationale of Capital Budgeting, Non-Discounting Capital Budgeting Techniques - Payback period, Profitability Index, Accounting Rate of Return
Unit-6	Investment Decisions**:** Discounting Techniques of Capital Budgeting - NPV, IRR, Discounting Payback Period Method, Estimation of Cash Flows, NPV v/s IRR, Risk analysis in Capital Budgeting - Sensitivity Analysis, Certainty Equivalent Approach.
Unit-7	Cost of Capital: Meaning and Concept, Cost of Debt, Cost of Equity, Cost of Retained Earnings, Calculation of WACC, International Dimensions in Cost of Capital
Unit-8	Financing Decisions**:** Capital Structure, Theories and Value of the firm - Net Income Approach, Net Operating Income Approach, Traditional Approach, Modigliani Miller Model, Determining the optimal Capital Structure, Checklist for Capital Structure Decisions, Costs of Bankruptcy and Financial Distress.
Unit-9	EBIT-EPS Analysis: Concept of Leverage, Types of Leverage: Operating Leverage, Financial Leverage, Combined Leverage
Unit-10	Dividend Decisions: Factors determining Dividend Policy, Theories of Dividend Gordon Model, Walter Model, MM Hypothesis
Unit-11	Forms of Dividend: Cash Dividend, Bonus Shares, Stock Split, Stock Repurchase, Dividend Policies in practice.

Unit-12	Working Capital Management: Working Capital Policies, Risk-Return trade-off, Cash management, Receivables management
Unit-13	Corporate Governance: Value-based Corporate culture, Disclosures, transparency and accountability, Corporate Governance and Human Resource Management, Evaluation of performance of board of directors, Succession planning, Public sector undertakings and corporate governance, Insider trading, Lessons from corporate failure
Unit-14	Economic outlook and Business Valuation: Impact of changing business environment on corporate valuation, climate change and corporate valuation, Business sustainability and corporate valuation, Role of environmental, social, and governance (ESG) factors in corporate valuation

READINGS:

1. FUNDAMENTALS OF CORPORATE FINANCE by JONATHAN BERK, PETER DeMARZO& JARRED HARDFORD, PEARSON
2. CORPORATE FINANCE by STEPHEN A. ROSS, RANDOLPH W. WESTERFIELD & JEFFREY JAFFE, McGRAW HILL

Course Code	DGEN530	CourseTitle	FUNDAMENTALS OF RESEARCH

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: develop research aptitude and get in-depth understanding of various methods of research.

CO2: identify the appropriate research problem and conduct research in an effective way.

CO3: understand indexing systems of various journals.

CO4: apply ethics of research in writing research paper and dissertation thesis.

CO5: understand basics of intellectual property rights.

Unit No.	Content
Unit-1	Basics of research: meaning of research, objectives of research, motivations in research, types of Research
Unit-2	Research approaches, significance of research, research process, criteria of good research, concept of theory: deductive and inductive theory
Unit-3	Literature survey and research gap identification, problem identification as per industrial and societal needs, potential and thrust areas, difference between scientific literature and advocacy literature
Unit-4	Hypothesis: qualities of a good hypothesis, null hypothesis and alternative hypothesis, use of databases, search engines and research gateways, framing of timeline/Gantt chart
Unit-5	Types and classification of journals, journal indexing, role of indexing in defining the quality of journal
Unit-6	Journal citation indices, h-index, h5-index, h5-median, g index, i-10 index, almetrics, JIF, JIF percentile, cite score, SJR, SNIP and Eigen factor
Unit-7	Research paper review process, citation, self-citation, funding agencies, Manupatra, academic social networks: Google scholar, academia research gate etc
Unit-8	Objectivity and subjectivity in research, integrity, carefulness, openness, respect for intellectual property, confidentiality, social responsibility, competence, legality and informed consent
Unit-9	Definition of Plagiarism, use of turn tin/authenticate software, role of referencing/bibliography in handling plagiarism, penalties and consequences, University Grants Commission's (UGC) policy for curbing plagiarism
Unit-10	Research writing including research paper, research proposal, review writing, thesis writing, Microsoft word (grammar checking, formatting of documents, incorporating references), reference styles
Unit-11	Poster preparation, coherence of the ideas, use of theory, Microsoft power point (creation of posters, slides for seminar/talk)

Unit-12	Introduction to intellectual property rights concept and theories kinds of intellectual property rights, introduction to patents, patent act 1970 – amendments of 1999, 2000, 2002 and 2005
Unit-13	Copyright and neighboring rights concept and principles, historical development of the concept of trademark and trademark law-National and International
Unit-14	International regime relating to IPR TRIPS and other Treaties (WIPO, WTO, GATTS)

READINGS:

1. RESEARCH DESIGN QUALITATIVE, QUANTITATIVE, AND MIXED METHODS APPROACHES by JOHN W. CRESWELL, SAGE PUBLICATIONS

Course Code	DMKT613	CourseTitle	CONSUMER BEHAVIOUR

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: understand the implications of consumer behavior concepts & theories for businesses and wider society.

CO2: discern how individuals and groups influence consumer behavior, and how marketers utilize this knowledge to help achieve organizational objectives.

CO3: analyze the dynamic interplay of internal and external factors influencing consumer behavior and accordingly develop a marketing strategy.

CO4: articulate practical and comprehensive managerial understanding of consumer behavior.

CO5: develop the understanding of marketing regulation, consumer protection act and contemporary issues in consumer behaviour.

Unit No.	Content
Unit-1	**Consumer Behavior and Marketing strategy:** consumer behaviour, market strategy and applications of consumer behavior.
Unit-2	**Market Analysis and Consumer Decisions:** market analysis components, segmentation strategy and consumer decisions and consumer behavior models.
Unit-3	**Culture and Group influence**: cultural and group influence on consumer behavior, concept of culture, cross cultural marketing strategy, the household life cycle and marketing strategy.
Unit-4	**IV Groups, Reference Group and Diffusion of Innovation**: groups, types of groups, reference group influence on consumption process & marketing strategies and diffusion of innovation.
Unit-5	**Perception**: perception, exposure, attention and interpretation, perception and marketing strategy.
Unit-6	**Learning and Personality:** memory's role in learning, learning theories, brand image and product positioning, brand equity and brand leverage motivation, personality and emotion.
Unit-7	**Motivation and Emotion**: motivation theory and marketing strategy use of personality in marketing practice, emotions and marketing strategy.
Unit-8	**Attitude and Market Segmentation**: attitude, influencing attitude, attitude components and change strategies, market segmentation and product development strategies based on attitudes.
Unit-9	**Self-Concept and Consumer Decisions**: nature of lifestyle, the VALS system consumer decision process and types of consumer decisions.
Unit-10	**Consumer Decision Making Process** : process of problem recognition and uncontrollable

	determinants of problem recognition, marketing strategy and problem recognition, information, alternative evaluation and selection, types and sources of information, consumer decision making and evaluation criteria.
Unit-11	**Decision Rules and Attributes of consumers:** decision rules for attitude based choices, attributes affecting retail outlet selection, consumer characteristics and outlet choice, in-store and online influence on brand choice and evaluation criteria.
Unit-12	**Post purchase Processes and Dissonance**: post purchase processes, post purchase dissonance, product use and non-use, disposition.
Unit-13	**Purchase Evaluation and Customer Satisfaction**: purchase evaluation, customer satisfaction, dissatisfaction responses, repeat purchase and customer commitment.
Unit-14	**Consumer Behavior and Marketing Regulation**: regulation and marketing to children, regulation and marketing to adults, consumer protection act and contemporary issues in consumer behavior.

READINGS:

1. CONSUMER BEHAVIOR- BUILDING MARKETING STARTEGY by DEL I HAWKINS, DAVID L
2. MOTHERSBAUGH, & AMIT MOOKERJEE, MCGRAW HILL EDUCATION
3. CONSUMER BEHAVIOR by KUMAR, S. R. , SCHIFFMAN, L.G. , WISENBLIT J., PEARSON
4. CONSUMER BEHAVIOR by RAJNEESH KRISHNA, OXFORD UNIVERSITY PRESS.
5. SCHIFFMAN, L. G., & KANUK, L. L. CONSUMER BEHAVIOR. NEW DELHI, PRENTICE HALL.

Course Code	DFIN548	Course Title	INTERNATIONAL FINANCIAL MANAGEMENT

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: understand the critical financial issues of international firms and international investors in present scenario.

CO2: analyze the framework of exchange rates and foreign exchange exposures and forces affecting exchange rates.

CO3: evaluate the international capital structure and international capital budgeting mechanism of multinational corporations.

CO4: analyze the different modes of raising finance in international market and significance of international finance in MNCs.

Unit No.	Content
Unit-1	**Introduction to International Financial management:** Domestic vs. international finance, International financial market integration, currency crisis, and global recession and risk spill over
Unit-2	Balance of Payments - Structure - Contents of Current, Capital, and Reserve Accounts – Linkages and Impact on Exchange Rates, Capital Markets, & Economy - Understanding BOP structure of a country for Investment and Raising Finance
Unit-3	**Foreign Exchange Markets and Exchange Rate Mathematics**: Nature, Functions, Transactions, Participants, Forex Markets in India, Forex dealing, Foreign exchange regimes, Foreign exchange rate determination, factors affecting foreign exchange
Unit-4	**Forecasting Foreign Exchange Rate:** Exchange Rate Forecasting– Purchasing Power Parity, Covered and Uncovered Interest Rate Parity – International Fisher's Effect - Forward Rate Parity–Influence of these parity relationships on Exchange Rates
Unit-5	**Foreign Exchange Spot and Derivative Market**: Spot and Forward Contracts- Cash and Spot Forex Trading, Forward Contracts- Long and Short Forward contract, Foreign Exchange Futures Contract- Contract specification trading at National Stock Exchange of India
Unit-6	**Management of Foreign Exchange Risk:** Foreign Exchange Exposure: Risk, Measurement and Management: Global Firms Foreign exchange exposure - Transaction, economic and translation exposures, potential currency exposure impact on global firms and investor performance
Unit-7	**International Capital Markets** - Sources of International Finance - Debt and Equity Markets –International Equity Diversification, Short-term Vs Long-term Finance – Export Import Finance
Unit-8	**Capital Structure of the Multinational Firm:** International Capital Structure – Parent Vs Subsidiary Norms, Global Capital Structure – Factors affecting the choice of markets and

	structure. International Cost of Capital – Calculation – Cost of Foreign Debt, Cost of Foreign Equity, Use of International CAPM
Unit-9	**Capital Budgeting of the Multinational Firm:** International Capital Budgeting – Key Issues – Unique Cash flows – Adjusted Present Value Approach. Foreign Direct Investment – Motives – Determinants – International Portfolio Diversification
Unit-10	**Working Capital Management of the Multinational Firm:** International Working Capital Management – International Cash Management – Decentralized Centralized Cash Management – Bilateral Vs Multilateral Netting – Central Cash Pool
Unit-11	**Option Contracts** American and European Currency Options, call and Put option, Option and risk management strategies. Introduction to currency swap, Foreign exchange risk management strategies through Forward contracts, future contracts, money market hedges, and options contracts.
Unit-12	**Managing Foreign Operations**: ADRs; benefits and costs of ADR holdings for investors; benefits and costs of ADR issuance for corporations, External Commercial Borrowing and International refinancing, issues and challenges before multinational subsidiaries
Unit-13	**Multinational Cash management**: Centralized perspective of Cash Flow Analysis, Techniques to Optimize Cash Flow- Leading and Lagging, Netting, Matching.
Unit-14	**Country Risk Analysis-** Nature of Country Risk Assessment, Techniques to assess Country Risk, Raters of Country Risk, Multinational Capital Budgeting: Problems and issues in Foreign Investment Analysis, Techniques of Multinational Capital Budgeting- NPV, IRR, APV

READINGS:

1. Shapiro, A.C. (2013). Multinational Financial Management. (10thed.). John, Inc.
2. Buckley, A. (2009). Multinational Finance. (5thed.). Pearson Education.
3. Levi, M.D. (2018). International Finance. (6th ed.). Rutledge Publications
4. Madura, J. (2018). International Financial Management. (13thed.). Cengage Learning India Pvt Ltd.

Course Code	DGEN531	Course Title	RESEARCH METHODS AND DESIGN

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: understand the basic functions of MS-Excel

CO2: discuss the fundamentals of statistics used in research and development

CO3: identify research techniques and their use in research

CO4: classify statistical methods in context of descriptive and inferential statistics

CO5: understand the various sampling and probability distribution

CO6: formulate and test hypothesis based on the nature of the research problem

Unit No.	Content
Unit-1	Basic introduction to sheets/workbook-cell, row, columns, basic operations, use of all excel options and add-ins.
Unit-2	Tabulation and graphical Presentation: Discrete data, continuous data and frequency distributions.
Unit-3	Graphs and their presentation, diagrammatic and graphical representation of data: bar diagram, pie-chart, line chart, histogram, frequency polygon and Ogive curves.
Unit-4	Introduction to types of data-Qualitative, Quantitative, Ordinal,
Unit-5	Measures of Central Tendency: Arithmetic Mean, Average Median and its importance, Characteristics of an ideal average
Unit-6	Measures of Concept of Central Tendency- Mean, Median, Mode Correlation and Regression Analysis
Unit-7	Linear Bivariate Regression, Correlation - Concept, Important
Unit-8	Methods - Scatter Diagram, Karl Pearson Coefficient of Correlation, Spearman's Rank Correlation.
Unit-9	Sampling and sampling Distribution: introduction to sampling, types of sampling: random and non random sampling,
Unit-10	Design of Experiments, introduction to sampling distributions
Unit-11	Probability: Definition and its concept, Addition Theorem, Multiplicative Theorem
Unit-12	Probability Distribution: Concept of probability distribution, Binomial Distribution, Normal Distribution
Unit-13	Estimation: introduction, basic concept of point estimation and interval estimation, Hypothesis, Null and Alternate Hypothesis, Types of errors - Type I and Type II, Hypothesis Testing and Concept of confidence interval: Introduction,

Unit-14	Importance and Types of Hypothesis, Hypothesis testing: t test, z test, chi-square, test of independence and goodness of fit(chi-square), one-way Analysis of Variance (ANOVA one way).

READINGS:

1. BUSINESS STATISTICS by J K SHARMA, VIKAS PUBLISHING HOUSE
2. RESEARCH METHODOLOGY: METHODS AND TECHNIQUES by C.R. KOTHARI AND GAURAV GARG, NEW AGE INTERNATIONAL
3. FUNDAMENTALS OF MATHEMATICAL STATISTICS by S C GUPTA, SULTAN CHAND & SONS (P) LTD.
4. STATISTICAL METHODS by S P GUPTA, S CHAND PUBLISHING

Course Code	DMKT512	CourseTitle	DIGITAL AND SOCIAL MEDIA MARKETING

WEIGHTAGES	
CA	ETE (Th.)
30	70

Course Outcomes:

CO1: define social media marketing goal setting necessary to achieve successful online campaigns.
CO2: describe the stages of the social media marketing strategy development process.
CO3: develop effective social media marketing strategies for various types of industries.
CO4: devise an integrated social media marketing strategy using a variety of services, tools and platforms to accomplish marketing objectives.
CO5: analyze the progress in achieving social media goals with a variety of powerfulmeasurement tools, services, and metrics.

Unit No.	Contents
Unit- 1	**Evolution of digital marketing**- the digital consumer & communities online and digital marketing landscape.
Unit- 2	**Search Engine Marketing**- Pay Per Click (PPC) and online advertising, search engine optimization and search engine marketing.
Unit- 3	**Social media and consumer engagement**: Social feedback cycle, social web and engagement, operations and marketing connection.
Unit- 4	**Customer engagement** -affiliate marketing & strategic partnerships-Email marketing-Content strategies.
Unit- 5	**New role of the customer**: social interactions, customer relationships, outreach and influencer relations.
Unit- 6	**Social listening**-importance of social analytics, know your influencers, web analytics, and business analytics.
Unit- 7	**Mobile Marketing**-integrating digital and social and media strategies.
Unit- 8	**Social technology and business decisions:** creation of social business, understanding the conversations, social CRM and decision support.
Unit- 9	**Social CRM:** social CRM and business design and build a social CRM program.
Unit- 10	**Engagement on the social web:** engagement as a customer activity, engagement as a business activity and extend engagement.
Unit- 11	**Social objects:** meaning of social object, build on existing social objects, create new social objects and use of social objects in business.
Unit- 12	**Social graph:** role of social graph, social graphs spread information, use of social graphs in the business and measure the social graphs.
Unit- 13	**Social applications:** importance of social applications, social applications drive engagement and planning a social application.

Unit- 14	**Social business ecosystem:** social profiles, social applications, using brand outposts and communities, social ecosystem**.**

READINGS:

1. SOCIAL MEDIA MARKETING by DAVE EVANS AND JAKE MCKEEE, WILEY
2. SOCIAL MEDIA MARKETING: A STRATEGIC APPROACH by MELISSA S. BARKER, DONALD I.BARKER, NICHOLAS F. BORMANN, DEBRA ZAHAY, MARY LOU ROBERTS, CENGAGE LEARNING
3. ADVANCED SOCIAL MEDIA MARKETING: HOW TO LEAD, LAUNCH, AND MANAGE A SUCCESSFUL SOCIAL MEDIA PROGRAM by TOM FUNK, APRESS

Course Code	DFIN508	Course Title	INTERNATIONAL BANKING AND FOREX MANAGEMENT

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:
CO1: understand the dimensions of international banking
CO2: establish legal and regulatory issues in international banking institutions
CO3: demonstrate foreign exchange market operations
CO4: discover the functions of different bodies in Foreign exchange management
CO5: analyze various management issues in international finance

Unit No.	Contents
Unit-1	**International banking:** global trends and developments in international banking, international financial centers, offshore banking units, profitability of international banking operations
Unit-2	**Offshore banking & offshore currency trading;** Factors contributing to the growth of international banking & Eurocurrency trading, regulatory asymmetry
Unit-3	**International finance:** fundamental principles of lending to MNCs, documentation and monitoring
Unit-4	**International credit appraisal:** International credit policy agencies and global capital markets, raising resources, project and infrastructure finance, financing of mergers and acquisitions
Unit-5	**Legal and regulatory aspects:** country risk and bank risk management, international debt management
Unit-6	**International regulatory bodies:** Role of IMF and World Bank in international debt crisis management, anti-money laundering laws
Unit-7	**Foreign exchange business:** Foreign exchange management act (FEMA), foreign exchange management philosophy, different types of exchange rates
Unit-8	**International Financial Markets:** Foreign exchange markets, international money markets, international credit markets, international bond markets & international stock markets; Regulatory asymmetry & its implications; Recycling of petrodollars
Unit-9	**Role of RBI towards FOREX:** RBI and FEDAI role in regulating foreign exchange, rules regarding rate structure, Indian norms

Unit-10	**International trade:** regulations covering international trade, various aspects of international trade, government policies
Unit-11	**International Trade organization:** DGFT and their schemes, customs procedures, banks' role in implementing these policies and schemes, WTO-its impact
Unit-12	**Foreign Exchange Risk Management -** Risk of forex fluctuations, impacts of global milieu, Types of fore risks, strategies for managing the risk, comprising policies, procedures and controls
Unit-13	**Challenges of international Banking:** Bank failure & safety nets, the problem of moral hazard & systemically important financial institutions; Problems in regulating international banking, regulatory arbitrage; BIS & Basel Committee-issues & challenges.
Unit-14	**Contemporary issues:** lessons from recent crisis in international banking crude oil relationship with foreign exchange, countries holding foreign exchange reserves, impact of federal policy decision on forex valuations, India economic crises of early nineties

READINGS:

1. INTERNATIONAL BANKING BY P. SUBRAMANIAN, MACMILLAN
2. INTERNATIONAL BANKING OPERATIONS by B. Y. OLKAR, A. K. TRIVEDI, A. K. PATWARDHAN, A. R. PAWSE, MACMILLAN

Course Code	DOPR639	Course Title	OPERATIONS MANAGEMENT AND RESEARCH

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:
CO1: analyze how to optimally utilize the resources.
CO2: apply the concepts in solving real life problems.
CO3: adapt different opinions and make correct judgment.
CO4: apply mathematical models to a given problem.
CO5: analyze the various decision-making environments and the tools applicable to them

Unit No.	Contents
Unit- 1	**Introduction to Operations Management and Research:** introduction and scope of operation management, emerging issues in operations management, history of operations research, definitions and features of operations research approach, models and modelling in operations research, applications of operations research
Unit- 2	**Forecasting:** introduction, features and elements of forecasting, forecast based on judgment and opinion, forecast based on time-series data, associative forecasting techniques, concept of forecasting errors
Unit- 3	**Design and layout:** production of goods versus delivery of services, product-process matrix, design process, product design, service design, process types, product and service profiling, automation, facility layout, line balancing
Unit- 4	**Location planning and analysis:** need and nature of location decisions, factors that affect location decisions, evaluating location alternatives
Unit- 5	**Management of quality:** defining quality-dimensions of quality, determinants of quality, the cost of quality, quality tools, total quality management, inspection, control charts for variables (mean and range chart), control charts for attributes (p-chart, c-chart), run test
Unit- 6	**Planning:** Aggregate Production Planning; Master Production Schedule and MRP, MRP-II, ERP
Unit- 7	**Inventory management**: nature and importance of inventories, inventory counting systems and inventory costs, economic production quantity, quantity discounts, EOQ model
Unit- 8	**Supply chain management:** need, elements, and benefit of effective SCM, logistics and reverse logistics, requirements, and steps for creating an effective supply chain, lean vs. agile supply chains
Unit- 9	**JIT and lean operations:** goals and building blocks of lean systems

Unit- 10	**Linear Programming:** general mathematical model of linear programming, linear programming formulation, graphical solution, simplex method, Big M method, special cases
Unit- 11	**Assignment and transportation problem:** Hungarian Assignment Model (HAM), special cases in assignment problem, Initial Basic Feasible Solution (IBFS) i.e. NWCM, LCM and VAM Method, optimization using stepping stone and MODI, special cases including concept of degeneracy
Unit- 12	**Project Management and Queuing Theory**: difference between PERT and CPM, PERT problem with three time estimates and concept of probability, basic concepts and parameters of a queuing model, m/m/1 model characteristics
Unit- 13	**Game Theory:** basics, saddle point, mixed strategies including odds, dominance, sub games and graphical method
Unit- 14	**Decision Theory:** basics including decision making environments, decision making under risk, expected value of perfect information, decision making under uncertainty, concept of decision trees, decision tree analysis

READINGS:

1. OPERATIONS MANAGEMENT by WILLIAM J STEVENSON, MCGRAW HILL EDUCATION
2. OPERATIONS MANAGEMENT by NORMAN GAITHER, GREGORY FRAZIER, CENGAGE LEARNING

Course Code	DMKT687	CourseTitle	CUSTOMER RELATIONSHIP MANAGEMENT

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: develop an insight and new learning in the area of customer relationship management.

CO2: identify and respond to customers' needs, expectations and issues to build productive and rewarding relationships with customers.

CO3: discuss the conceptual foundations of relationship marketing and its implications for further knowledge development in the field of business.

CO4: develop a conceptual understanding and the knowledge pertaining to practical application for building and managing partnering relationships with customers and suppliers.

CO5: analyze how CRM is being used in consumer and business markets-implementation, management, benefits, problems and solutions.

Unit	Topics
Unit- 1	**Introduction to CRM:** definition, CRM as a business strategy, elements of CRM, processes and systems, entrance, applications and success of CRM.
Unit- 2	**Conceptual Foundations:** -evolution and benefits of CRM; building customer relationship and zero customer defection.
Unit- 3	**Strategy and Organization of CRM:** customer-supplier relationships, CRM as an integral business strategy and the relationship-oriented organization.
Unit- 4	**CRM Marketing Aspects:** customer knowledge, communication and multichannel, the individualized customer proposition and the relationship policy.
Unit- 5	**Analytical CRM:** relationship data management, data analyses and data mining, segmentation and selections, retention and cross-sell analyses.
Unit- 6	**Operational CRM:**call center management, use of internet, website and applications of direct mail.
Unit- 7	**CRM Systems and their Implementation:** CRM systems, implementation of CRM systems, and the future aspects.
Unit- 8	**E CRM:** application of e-CRM technologies-emails, websites, chat rooms, forums and other channels.
Unit- 9	**CRM Process:** introduction and objectives of a CRM process, an insight into CRM and ECRTA and online CRM.
Unit- 10	**Developing CRM Strategy:** role of CRM in business strategy and understanding service quality with regard to CRM.
Unit- 11	**CRM Links in E-Business:** E-Commerce and customer relationships on the internet.

Unit- 12	**Economics of Customer Relationship Management**: market share Vs customer share orientation, customer life time value and customer profitability.
Unit- 13	**CRM Implementation:** choosing the right CRM solution and framework for implementing CRM.
Unit- 14	**CRM Application in B2B and B2C Market:** importance of CRM in B2B and B2C market, benefits of B2C and B2B CRM, B2B and B2C application in banking and hospitality sectors.

READINGS:

1. CUSTOMER RELATIONSHIP MANAGMENT by ED PEELEN, Pearson Education India
2. THE CRM HANDBOOK- A BUSINESS GUIDE TO CUSTOMER RELATIONSHIP MANAGEMENT by JILL DYCHE, Pearson Education India.
3. CUSTOMER RELATIONSHIP MANAGEMENT-GETTING IT RIGHT by JUDITH W. KINCAID. Pearson Education India.

Course Code	DFIN611	Course Title	SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

WEIGHTAGES	
CA	ETE(Th.)
30	70

Course Outcomes:

CO1: assess the characteristics of different Investment alternatives and how to trade in the stock market.

CO2: apply different valuation models to find the intrinsic value of the shares.

CO3: use the fundamental and technical analysis to predict the stock price movement.

CO4: construct, revise and evaluate portfolios of different securities.

Unit No.	Contents
Unit-1	**Introduction to Security Analysis**: securities market structure, major Indian stock exchanges, stock exchange players, investment objectives, investment process, investment alternatives, investment alternatives evaluation, and common error in investment process
Unit-2	**Risk and Return**: concept of return, measurement of return, concept of risk, types of risk, measurement of risk
Unit-3	**Equity valuation**: balance sheet valuation, dividend discount model, free cash flow model, earning multiplier approach
Unit-4	**Fixed Income and Other Investment Alternatives**: pricing, yields and risks of investments in fixed income securities, real estate, commodities, other alternative investments, strategies for investments in various investment alternatives
Unit-5	**Efficient Market Hypothesis:** forms of EMH, test for EMH, depository system, depository process and participants, calculation of sensex and nifty, listing of securities
Unit-6	**Fundamental Analysis**: industry analysis, economic analysis, company analysis, introduction to fundamental analysis, financial health
Unit-7	**Technical Analysis:** technical indicators, Dow Theory, fundamental v/s technical analysis, Elliot wave theory, chart patterns
Unit-8	**Portfolio Construction and Management**: portfolio risk, portfolio return, diversification, Markowitz model
Unit-9	**Portfolio Risk and Return Management**: portfolio risk and return with different correlations, efficient frontier, optimal portfolio
Unit-10	**Asset Pricing**: standard capital asset pricing model, capital asset pricing model, arbitrage pricing theory
Unit-11	**Derivative and Regulatory Aspect**: meaning and reasons of derivative trading, types of derivatives, forward, futures and options, regulation of derivative market
Unit-12	**Evaluation of Portfolio Performance**: Sharpe's performance index, Treynor's

	performance index, Jensen performance index
Unit-13	**Portfolio Revision**: active and passive management, rupee cost averaging, constant rupee plan, constant ratio plan, variable ratio plan
Unit-14	**Contemporary Issues in Investment**: fintech scope and challenges, algo trading issues and development, robo advisors, high frequency trade

READINGS:

1. SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT by K SASIDHARAN & ALEX K MATHEWS, MCGRAW HILL EDUCATION
2. SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT by PUNITHAVATHY PANDIAN, VIKAS PUBLISHING HOUSE